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Department of Health & Environment

Sam Brownback, Governor

MEMORANDUM

DATE: January 3, 2012

TO: Johnson County 2.1 File
2011 Funding EPA CWSRF
KWPCRF Project No.: C20 1920 01

FROM: Rod Geisler, PE, Chief Municipal Programs Section 

SUBJECT: Johnson County, Kansas
Project to Construct Low Pressure Sewer System in the (Lake Gardner)
Lateral Sewer District No. 1 of Kill Creek No. 2 Service Area
EPA Green Project Reserve

Similar to the ARRA funding effort, the Federal Clean Water SRF funding provided in FFY 2011 requires a 20% "Green Project Reserve" (GPR) for use of the Federal funds. EPA wrote new guidance to define qualifying uses for the Green Project Reserve requirements for the FFY 2011 funding (copy attached). As stated on page 1, paragraph "II. GPR Goals." The "intent" is "to guide funding toward projects that...adopt practices that reduce the environmental footprint of...wastewater...collection...and promote innovative approaches to water management problems". The project at Lake Gardner in Johnson County, Kansas, achieves this goal by providing a method to collect sewage from existing homes utilizing a grinder pump low pressure sewer (GP/LPS) system which also removes the potential health threat of failing on-site systems serving existing homes around a public water supply and public recreation lake. Pumping the sewage flow is much more energy efficient than hauling by truck from holding tanks.

The project being funded will provide the installation of a GP/LPS system with sewage treatment at an existing wastewater treatment facility for homes and vacant lots surrounding Lake Gardner in Johnson County, Kansas. The project includes installation of all other necessary appurtenant facilities and electrical equipment to assure a successful construction project. A review of the FFY 2011 GPR guidance as presented below indicates this project meets the requirements to qualify as a Green Project Reserve project in accordance with these Federal guidelines.

0.1 All GPR projects must otherwise be eligible for CWSRF funding.

- The project at Lake Gardner is eligible.

0.2 All Section 212 projects must be consistent with the definition of "treatment works" as set forth in Section 212 of the Clean Water Act (CWA).

- The project at Lake Gardner is a "Section 212" project, the new GP/LPS collection system will be publicly owned, and the project will have an indirect water quality benefit by improving the efficiency and reliability of the collection of sewage from existing homes.

0.3 Eligible non-point source projects...

- 0.3.6. This is a 319 non-point source pollution control project utilizing a Section 212 (grinder pump low pressure sewer collection system) solution. An NPDES permit is not needed as collected sewage will be pumped to a nearby existing wastewater treatment plant.

0.4 Eligible projects under Section 320...

- NA. This is not a Section 320 project.

0.5 GPR projects must meet the definition of one of the four GPR categories.

- See below

0.6 GPR projects must further the goals of the Clean Water Act.

- See below

CWSRF Technical Guidance

1.0 Green Infrastructure

- NA

2.0 Water Efficiency

- NA

3.0 Energy Efficiency

- NA

4.0 Environmentally Innovative

- See below and see attachments

4.1 Definition: Environmentally innovative projects include those that demonstrate new and/or innovative approaches to delivering services or managing water resources in a more sustainable way.

- Also see below.

4.2 Categorical Projects

4.2-1 Total/integrated water resources management planning likely to result in a capital project.

- NA

4.2-2 Utility Sustainability Plan consistent with EPA SRF's sustainability policy.

- NA

4.2-3 Greenhouse gas (GHG) inventory or mitigation plan and submission of a GHG inventory to a registry (such as Climate Leaders or Climate Registry)

4.3-3a Note: GHG Inventory and mitigation plan is eligible for CWSRF funding.

4.2-3b EPA Climate Leaders:

<http://www.epa.gov/climateleaders/basic/index.html>

Climate Registry: <http://www.theclimateregistry.org/>

- NA

4.2-4 Planning activities by a POTW to prepare for adaptation to the long-term effects of climate change and/or extreme weather.

4.2-4a Office of Water – Climate Change and Water website:

<http://www.epa.gov/water/climatechange/>

- NA

4.2.5 Construction of US Building Council LEED certified buildings or renovation of an existing building on POTW facilities.

4.2-5a Any level of certification (Platinum, Gold, Silver, Certified).

4.2-5b All building costs are eligible, not just stormwater, water efficiency and energy efficiency related costs. Costs are not limited to the incremental additional costs associated with LEED certified buildings.

4.2-5c U.S. Green Building Council website:

<http://www.usgbc.org/displaypage.aspx?CategoryID=19>

- NA

4.2-6 Decentralized wastewater treatment solutions to existing deficient or failing onsite wastewater systems.

4.2-6a Decentralized wastewater systems include individual onsite and/or cluster wastewater systems used to collect, treat and disperse relatively small volumes of wastewater. An individual onsite wastewater treatment system is a system relying on natural processes and/or mechanical components, that is used to collect, treat and disperse or reclaim wastewater from a single dwelling or building. A cluster system is a wastewater collection and treatment system under some form of common ownership that collects wastewater from two or more dwellings or buildings and conveys it to a treatment and dispersal system located on a suitable site near the dwellings or buildings. Decentralized projects may include a combination of these systems. EPA recommends that decentralized systems be managed under a central management entity with enforceable program requirements, as stated in the EPA Voluntary Management Guidelines. http://www.epa.gov/owm/septic/pubs/septic_guidelines.pdf

- The existing decentralized system consists of onsite holding tanks, or onsite septic tanks with lateral fields operated and regulated as holding tanks, to alleviate sewage discharge and leakage into Lake Gardner. The existing systems are individually owned and regulated by the local County Health Department. The new GP/LPS system will be constructed by the County Sewer District formed for this purpose, and operations will be managed under the central management entity Johnson County Wastewater.

4.2-6b Treatment and Collection Options: A variety of treatment and collection options are available when implementing decentralized wastewater systems. They typically include a septic tank, although many configurations include additional treatment components following or in place of the septic tank, which provide for advanced treatment solutions. Most disperse treated effluent to the soil where further treatment occurs, utilizing either conventional soil absorption fields or alternative soil dispersal methods which provide advanced treatment. Those that discharge to streams, lakes, tributaries, and other water bodies require federal or state discharge permits (see below). Some systems promote water reuse/recycling, evaporation or wastewater uptake by plants. Some decentralized systems, particularly cluster or community systems, often utilize alternative methods of collection with small diameter pipes which can flow via gravity, pump, or siphon, including pressure sewers, vacuum sewers and small diameter gravity sewers. Alternative collection systems

generally utilize piping that is less than 8 inches in diameter, or the minimum diameter allowed by the state if greater than 8 inches, with shallow burial and do not require manholes or lift stations. Septic tanks are typically installed at each building served or another location upstream of the final treatment and dispersal site. Collection systems can transport raw sewage or septic tank effluent. Another popular dispersal option used today is subsurface drip infiltration. Package plants that discharge to the soil are generally considered decentralized, depending on the situation in which they are used. While not entirely inclusive, information on treatment and collection processes is described, in detail, in the "Onsite Wastewater Treatment Technology Fact Sheets" section of the EPA Onsite Manual http://www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf and on EPA's septic system website under Technology Fact Sheets. http://cfpub.epa.gov/owm/septic/septic.cfm?page_id=283

- The new decentralized system to serve Lake Gardner area residences will utilize a GP/LPS alternative collection system with individual grinder pump units at existing homes and small diameter collector pressure sewers with shallow burial and no manholes or centralized pump stations. The system will transport raw sewage to an existing nearby wastewater treatment facility.

4.3 Projects That Do Not Meet the Definition of Environmentally Innovative

- NA

4.4 Decision Criteria for Business Cases

- NA

4.5 Examples of Projects Requiring a Business Case

- NA

Therefore, the project to construct a GP/LPS collection system to serve residential properties near Lake Gardner meets the EPA definition of being "categorically" green, as defined in the EPA Green Project Reserve guidelines.

The loan agreement is funded by the FFY 2011 Cap Grant and so will provide 15% principal forgiveness for all engineering and construction costs, and will also provide an additional 25% principal forgiveness for the cost of construction of the qualifying "green design components" based on the approved bid form and a proportionate amount of the engineering costs. Based on information presently available, the entire project is expected to qualify as "green design components".

The estimated total cost of the project is \$8,331,778. The loan amount will be \$8,131,778, as the project applicant will project \$200,000 for the ineligible cost of easements. The entire loan cost is considered eligible for 40% principal forgiveness, subject to final review of design plans and specifications and all project costs. A follow up memo based on the approved design will provide this eligibility review for the record.

Attachments

- FFY 2011 EPA GPR Guidance (14 pp)
- Excerpts of the "Lateral Sewer Study Area Number 1 of Kill Creek
Number 2 – Sewer Service Evaluation – Facility Plan" dated
Final: September 2011 (10 pp)
- KDHE – TMDL – Gardner Lake – Dissolved Oxygen – Approved by
EPA January 20, 2000
- KDHE – TMDL – Gardner Lake – Eutrophication – Approved by
EPA January 26, 2000

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ATTACHMENT 2

2011 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve: Guidance for Determining Project Eligibility

I. Introduction: The Fiscal Year (FY) 2011 Full-Year Continuing Appropriation Act (P.L. 112-10) included additional requirements affecting both the Clean Water and the Drinking Water State Revolving Fund (SRF) programs. This attachment is included in the *Procedures for Implementing Certain Provisions of EPA's Fiscal Year 2011 Full-Year Continuing Appropriation Affecting the Clean Water and Drinking Water State Revolving Fund Programs*. Because of differences in project eligibility for each program, the Clean and Drinking Water SRFs have separate guidance documents that identify specific goals and eligibilities for green infrastructure, water and energy efficient improvements, and environmentally innovative activities. Part A includes the details for the Clean Water SRF program, and Part B the Drinking Water SRF program.

Public Law 112-10 carries forward language from the FY 2010 Appropriation that states: "Provided, that for fiscal year 2010, to the extent there are sufficient eligible project applications, not less than 20 percent of the funds made available under this title to each State for Clean Water State Revolving Fund capitalization grants and not less than 20 percent of the funds made available under this title to each State for Drinking Water State Revolving Fund capitalization grants shall be used by the State for projects to address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities." These four categories of projects are the components of the Green Project Reserve (GPR).

II. GPR Goals: Congress' intent in enacting the GPR is to direct State investment practices in the water sector to guide funding toward projects that utilize green or soft-path practices to complement and augment hard or gray infrastructure, adopt practices that reduce the environmental footprint of water and wastewater treatment, collection, and distribution, help utilities adapt to climate change, enhance water and energy conservation, adopt more sustainable solutions to wet weather flows, and promote innovative approaches to water management problems. Over time, GPR projects could enable utilities to take savings derived from reducing water losses and energy consumption, and use them for public health and environmental enhancement projects. Additionally, EPA expects that green projects will help the water sector improve the quality of water services without putting additional strain on the energy grid, and by reducing the volume of water lost every year.

III. Background: For the FY 2010 GPR Guidance, EPA used an inclusive approach to determine what is and is not a 'green' water project. Wherever possible, this guidance references existing consensus-based industry practices to provide assistance in developing green projects. Input was solicited from State-EPA and EPA-Regional workgroups and the water sector. EPA staff also reviewed approaches promoted by green practice advocacy groups and water associations, and green infrastructure implemented by engineers and managers in the water sector. EPA also

assessed existing 'green' policies within EPA and received input from staff in those programs to determine how EPA funds could be used to achieve shared goals.

The FY 2011 SRF GPR Guidance provides States with information needed to determine which projects count toward the GPR requirement. The intent of the GPR Guidance is to describe projects and activities that fit within the four specific categories listed in the FY 2010 Appropriations Act which also apply to the FY 2011 Full-Year Continuing Appropriation. This guidance defines each category of GPR projects and lists projects that are clearly eligible for GPR, heretofore known as categorically eligible projects. For projects that do not appear on the list of categorically eligible projects, they may be evaluated for their eligibility within one of the four targeted types of GPR eligible projects based upon a business case that provides clear documentation (see the *Business Case Development* sections in Parts A & B below).

GPR may be used for planning, design, and/or building activities. Entire projects, or the appropriate discrete components of projects, may be eligible for GPR. Projects do not have to be part of a larger capital project to be eligible. All projects or project components counted toward the GPR requirement must clearly advance one or more of the objectives articulated in the four categories of GPR discussed below.

The Green Project Reserve sets a new precedent for the SRFs by targeting funding towards projects that States may not have funded in prior years. Water quality benefits from GPR projects rely on proper operation and maintenance to achieve the intended benefits of the projects and to achieve optimal performance of the project. EPA encourages states and funding recipients to thoroughly plan for proper operation and maintenance of the projects funded by the SRFs, including training in proper operation of the project. It is noted, however, that the SRFs cannot provide funding for operation and maintenance costs, including training, in the SRF assistance agreements. Some of these costs may, however, be funded through appropriate DWSRF set-asides under limited conditions.

PART A – CWSRF GPR SPECIFIC GUIDANCE

CWSRF Eligibility Principles

State SRF programs are responsible for identifying projects that count toward GPR. The following overarching principles, or decision criteria, apply to all projects that count toward GPR and will help states identify projects.

0.1 All GPR projects must otherwise be eligible for CWSRF funding. The GPR requirement does not create new funding authority beyond that described in Title VI of the CWA. Consequently, a subset of 212, 319 and 320 projects will count towards the GPR. The principles guiding CWSRF funding eligibility include:

- 0.2 All Sec 212 projects must be consistent with the definition of “treatment works” as set forth in section 212 of the Clean Water Act (CWA).
 - 0.2-1 All section 212 projects must be publicly owned, as required by CWA section 603(c)(1).
 - 0.2-2 All section 212 projects must serve a public purpose.
 - 0.2-3 POTWs as a whole are utilized to protect or restore water quality. Not all portions of the POTW have a direct water quality impact in and of themselves (i.e. security fencing). Consequently, POTW projects are not required to have a direct water quality benefit, though most of them will.
- 0.3 Eligible nonpoint source projects implement a nonpoint source management program under an approved section 319 plan or the nine element watershed plans required by the 319 program.
 - 0.3-1 Projects prevent or remediate nonpoint source pollution.
 - 0.3-2 Projects can be either publicly or privately owned and can serve either public or private purposes. For instance, it is acceptable to fund land conservation activities that preserve the water quality of a drinking water source, which represents a public purpose project. It is also acceptable to fund agricultural BMPs that reduce nonpoint source pollution, but also improve the profitability of the agricultural operation. Profitability is an example of a private purpose.
 - 0.3-3 Eligible costs are limited to planning, design and building of capital water quality projects. The CWSRF considers planting trees and shrubs, purchasing equipment, environmental cleanups and the development and initial delivery of education programs as capital water quality projects. Daily maintenance and operations, such as expenses and salaries are not considered capital costs.
 - 0.3-4 Projects must have a direct water quality benefit. Implementation of a water quality project should, in itself, protect or improve water quality. States should be able to estimate the quantitative and/or qualitative water quality benefit of a nonpoint source project.
 - 0.3-5 Only the portions of a project that remediate, mitigate the impacts of, or prevent water pollution or aquatic or riparian habitat degradation should be funded. Where water quantity projects improve water quality (e.g. reduction of flows from impervious surfaces that adversely affect stream health, or the modification of

irrigation systems to reduce runoff and leachate from irrigated lands), they would be considered to have a water quality benefit. In many cases, water quality protection is combined with other elements of an overall project. For instance, brownfield revitalization projects include not only water quality assessment and cleanup elements, but often a redevelopment element as well. Where the water quality portion of a project is clearly distinct from other portions of the project, only the water quality portion can be funded by the CWSRF.

- 0.3-6 Point source solutions to nonpoint source problems are eligible as CWSRF nonpoint source projects. Section 319 Nonpoint Source Management Plans identify sources of nonpoint source pollution. In some cases, the most environmentally and financially desirable solution has point source characteristics and requires an NPDES discharge permit. For instance, a septage treatment facility may be crucial to the proper maintenance and subsequent functioning of decentralized wastewater systems. Without the septage treatment facility, decentralized systems are less likely to be pumped, resulting in malfunctioning septic tanks.
- 0.4 Eligible projects under section 320 implement an approved section 320 Comprehensive Conservation Management Plan (CCMP).
 - 0.4-1 Section 320 projects can be either publicly or privately owned.
 - 0.4-2 Eligible costs are limited to capital costs.
 - 0.4-3 Projects must have a direct benefit to the water quality of an estuary. This includes protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on water, and requires the control of point and nonpoint sources of pollution to supplement existing controls of pollution.
 - 0.4-4 Only the portions of a project that remediate, mitigate the impacts of, or prevent water pollution in the estuary watershed should be funded.
- 0.5 GPR projects must meet the definition of one of the four GPR categories. The Individual GPR categories do not create new eligibility for the CWSRF. The projects that count toward GPR must otherwise be eligible for CWSRF funding.
- 0.6 GPR projects must further the goals of the Clean Water Act.¹

¹ Drinking Water Utilities can apply for CWSRF funding

CWSRF Technical Guidance

The following sections outline the technical aspects for the CWSRF Green Project Reserve. It is organized by the four categories of green projects: green infrastructure, water efficiency, energy efficiency, and environmentally innovative activities. Categorically green projects are listed, as well as projects that are ineligible. Design criteria for business cases and example projects that would require a business case are also provided.

1.0 GREEN INFRASTRUCUTRE

- 1.1 Definition: Green stormwater infrastructure includes a wide array of practices at multiple scales that manage wet weather and that maintain and restore natural hydrology by infiltrating, evapotranspiring and harvesting and using stormwater. On a regional scale, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale green infrastructure consists of site- and neighborhood-specific practices, such as bioretention, trees, green roofs, permeable pavements and cisterns.
- 1.2 Categorical Projects
 - 1.2-1 Implementation of green streets (combinations of green infrastructure practices in transportation rights-of-ways), for either new development, redevelopment or retrofits including: permeable pavement², bioretention, trees, green roofs, and other practices such as constructed wetlands that can be designed to mimic natural hydrology and reduce effective imperviousness at one or more scales. Vactor trucks and other capital equipment necessary to maintain green infrastructure projects.
 - 1.2-2 Wet weather management systems for parking areas including: permeable pavement², bioretention, trees, green roofs, and other practices such as constructed wetlands that can be designed to mimic natural hydrology and reduce effective imperviousness at one or more scales. Vactor trucks and other capital equipment necessary to maintain green infrastructure projects.
 - 1.2-3 Implementation of comprehensive street tree or urban forestry programs, including expansion of tree boxes to manage additional stormwater and enhance tree health.
 - 1.2-4 Stormwater harvesting and reuse projects, such as cisterns and the systems that allow for utilization of harvested stormwater, including pipes to distribute stormwater for reuse.
 - 1.2-5 Downspout disconnection to remove stormwater from sanitary, combined sewers and separate storm sewers and manage runoff onsite.

² The total capital cost of permeable pavement is eligible, not just the incremental additional cost when compared to impervious pavement.

- 1.2-6 Comprehensive retrofit programs designed to keep wet weather discharges out of all types of sewer systems using green infrastructure technologies and approaches such as green roofs, green walls, trees and urban reforestation, permeable pavements and bioretention cells, and turf removal and replacement with native vegetation or trees that improve permeability.
- 1.2-7 Establishment or restoration of permanent riparian buffers, floodplains, wetlands and other natural features, including vegetated buffers or soft bioengineered stream banks. This includes stream day lighting that removes natural streams from artificial pipes and restores a natural stream morphology that is capable of accommodating a range of hydrologic conditions while also providing biological integrity. In highly urbanized watersheds this may not be the original hydrology.
- 1.2-8 Projects that involve the management of wetlands to improve water quality and/or support green infrastructure efforts (e.g., flood attenuation).³
 - 1.2-8a Includes constructed wetlands.
 - 1.2-8b May include natural or restored wetlands if the wetland and its multiple functions are not degraded and all permit requirements are met.
- 1.2-9 The water quality portion of projects that employ development and redevelopment practices that preserve or restore site hydrologic processes through sustainable landscaping and site design.
- 1.2-10 Fee simple purchase of land or easements on land that has a direct benefit to water quality, such as riparian and wetland protection or restoration.
- 1.3 Projects That Do Not Meet the Definition of Green Infrastructure
 - 1.3-1 Stormwater controls that have impervious or semi-impervious liners and provide no compensatory evapotranspirative or harvesting function for stormwater retention.
 - 1.3-2 Stormwater ponds that serve an extended detention function and/or extended filtration. This includes dirt lined detention basins.
 - 1.3-3 In-line and end-of-pipe treatment systems that only filter or detain stormwater.
 - 1.3-4 Underground stormwater control and treatment devices such as swirl concentrators, hydrodynamic separators, baffle systems for grit, trash removal/floatables, oil and grease, inflatable booms and dams for in-line underground storage and diversion of flows.
 - 1.3-5 Stormwater conveyance systems that are not soil/vegetation based (swales) such as pipes and concrete channels. Green infrastructure projects that include pipes to collect stormwater may be justified as innovative environmental projects pursuant to Section 4.4 of this guidance.
 - 1.3-6 Hardening, channelizing or straightening streams and/or stream banks.
 - 1.3-7 Street sweepers, sewer cleaners, and vacuum trucks unless they support green infrastructure projects.

³ Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, vernal pools, and similar areas.

- 1.4 Decision Criteria for Business Cases
 - 1.4-1 Green infrastructure projects are designed to mimic the natural hydrologic conditions of the site or watershed.
 - 1.4-2 Projects that capture, treat, infiltrate, or evapotranspire water on the parcels where it falls and does not result in interbasin transfers of water.
 - 1.4-3 GPR project is in lieu of or to supplement municipal hard/gray infrastructure.
 - 1.4-4 Projects considering both landscape and site scale will be most successful at protecting water quality.
 - 1.4-5 Design criteria are available at:
<http://cfpub.epa.gov/npdes/greeninfrastructure/munichandbook.cfm> and
<http://cfpub.epa.gov/npdes/greeninfrastructure/technology.cfm>
- 1.5 Examples of Projects Requiring A Business Case
 - 1.5-1 Fencing to keep livestock out of streams and stream buffers. Fencing must allow buffer vegetation to grow undisturbed and be placed a sufficient distance from the riparian edge for the buffer to function as a filter for sediment, nutrients and other pollutants.

2.0 WATER EFFICIENCY

- 2.1 Definition: EPA's WaterSense program defines water efficiency as the use of improved technologies and practices to deliver equal or better services with less water. Water efficiency encompasses conservation and reuse efforts, as well as water loss reduction and prevention, to protect water resources for the future.
- 2.2 Categorical Projects
 - 2.2-1 Installing or retrofitting water efficient devices, such as plumbing fixtures and appliances
 - 2.2-1a For example -- shower heads, toilets, urinals and other plumbing devices
 - 2.2-1b Where specifications exist, WaterSense labeled products should be the preferred choice (<http://www.epa.gov/watersense/index.html>).
 - 2.2-1c Implementation of incentive programs to conserve water such as rebates.
 - 2.2-2 Installing any type of water meter in previously unmetered areas
 - 2.2-2a If rate structures are based on metered use
 - 2.2-2b Can include backflow prevention devices if installed in conjunction with water meter
 - 2.2-3 Replacing existing broken/malfunctioning water meters, or upgrading existing meters, with:
 - 2.2-3a Automatic meter reading systems (AMR), for example:
 - 2.2-3a(i) Advanced metering infrastructure (AMI)
 - 2.2-3a(ii) Smart meters
 - 2.2-3b Meters with built in leak detection
 - 2.2-3c Can include backflow prevention devices if installed in conjunction with water meter replacement

- 2.2-4 Retrofitting/adding AMR capabilities or leak detection equipment to existing meters (not replacing the meter itself).
- 2.2-5 Water audit and water conservation plans, which are reasonably expected to result in a capital project.
- 2.2-6 Recycling and water reuse projects that replace potable sources with non-potable sources,
 - 2.2-6a Gray water, condensate and wastewater effluent reuse systems (where local codes allow the practice)
 - 2.2-6b Extra treatment costs and distribution pipes associated with water reuse.
- 2.2-7 Retrofit or replacement of existing landscape irrigation systems with more efficient landscape irrigation systems, including moisture and rain sensing equipment.
- 2.2-8 Retrofit or replacement of existing agricultural irrigation systems with more efficient agricultural irrigation systems.
- 2.3 Projects That Do Not Meet the Definition of Water Efficiency
 - 2.3-1 Agricultural flood irrigation.
 - 2.3-2 Lining of canals to reduce water loss.
 - 2.3-3 Replacing drinking water distribution lines. This activity extends beyond CWSRF eligibility and is more appropriately funded by the DWSRF.
 - 2.3-4 Leak detection equipment for drinking water distribution systems, unless used for reuse distribution pipes.
- 2.4 Decision Criteria for Business Cases
 - 2.4-1 Water efficiency can be accomplished through water saving elements or reducing water consumption. This will reduce the amount of water taken out of rivers, lakes, streams, groundwater, or from other sources.
 - 2.4-2 Water efficiency projects should deliver equal or better services with less net water use as compared to traditional or standard technologies and practices
 - 2.4-3 Efficient water use often has the added benefit of reducing the amount of energy required by a POTW, since less water would need to be collected and treated; therefore, there are also energy and financial savings.
- 2.5 Examples of Projects Requiring a Business Case.
 - 2.5-1 Water meter replacement with traditional water meters (see AWWA M6 *Water Meters – Selection Installation, Testing, and Maintenance*).
 - 2.5-2 Projects that result from a water audit or water conservation plan
 - 2.5-3 Storage tank replacement/rehabilitation to reduce loss of reclaimed water.
 - 2.5-4 New water efficient landscape irrigation system (where there currently is not one).
 - 2.5-5 New water efficient agricultural irrigation system (where there currently is not one).

3.0 ENERGY EFFICIENCY

- 3.1 Definition: Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water quality projects, use energy in a more efficient way, and/or produce/utilize renewable energy.
- 3.2 Categorical Projects
- 3.2-1 Renewable energy projects such as wind, solar, geothermal, micro-hydroelectric, and biogas combined heat and power systems (CHP) that provide power to a POTW. (<http://www.epa.gov/cleanenergy>). Micro-hydroelectric projects involve capturing the energy from pipe flow.
 - 3.2-1a POTW owned renewable energy projects can be located onsite or offsite.
 - 3.2-1b Includes the portion of a publicly owned renewable energy project that serves POTW's energy needs.
 - 3.2-1c Must feed into the grid that the utility draws from and/or there is a direct connection.
 - 3.2-2 Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR⁴. Retrofit projects should compare energy used by the existing system or unit process⁵ to the proposed project. The energy used by the existing system should be based on name plate data when the system was first installed, recognizing that the old system is currently operating at a lower overall efficiency than at the time of installation. New POTW projects or capacity expansion projects should be designed to maximize energy efficiency and should select high efficiency premium motors and equipment where cost effective. Estimation of the energy efficiency is necessary for the project to be counted toward GPR. If a project achieves less than a 20% reduction in energy efficiency, then it may be justified using a business case.
 - 3.2-3 Collection system Infiltration/Inflow (I/I) detection equipment
 - 3.2-4 POTW energy management planning, including energy assessments, energy audits, optimization studies, and sub-metering of individual processes to determine high energy use areas, which are reasonably expected to result in a capital project are eligible. Guidance to help POTWs develop energy management programs, including assessments and audits is available at http://www.epa.gov/waterinfrastructure/pdfs/guidebook_si_energymangement.pdf.

⁴ The 20% threshold for categorically eligible CWSRF energy efficiency projects was derived from a 2002 Department of Energy study entitled *United States Industrial Electric Motor Systems Market Opportunities Assessment, December 2002* and adopted by the Consortium for Energy Efficiency. Further field studies conducted by Wisconsin Focus on Energy and other State programs support the threshold.

⁵ A unit process is a portion of the wastewater system such as the collection system, pumping stations, aeration system, or solids handling, etc.

- 3.3 Projects That Do Not Meet the Definition of Energy Efficiency
 - 3.3-1 Renewable energy generation that is *privately* owned or the portion of a publicly owned renewable energy facility that does not provide power to a POTW, either through a connection to the grid that the utility draws from and/or a direct connection to the POTW.
 - 3.3-2 Simply replacing a pump, or other piece of equipment, because it is at the end of its useful life, with something of average efficiency.
 - 3.3-3 Facultative lagoons, even if integral to an innovative treatment process.
 - 3.3-4 Hydroelectric facilities, except micro-hydroelectric projects. Micro-hydroelectric projects involve capturing the energy from pipe flow.
- 3.4 Decision Criteria for Business Cases
 - 3.4-1 Project must be cost effective. An evaluation must identify energy savings and payback on capital and operation and maintenance costs that does not exceed the useful life of the asset.
http://www.epa.gov/waterinfrastructure/pdfs/guidebook_si_energymanagement.pdf
 - 3.4-2 The business case must describe how the project maximizes energy saving opportunities for the POTW or unit process.
 - 3.4-3 Using existing tools such as Energy Star's Portfolio Manager (http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager) or Check Up Program for Small Systems (CUPSS) (<http://www.epa/cupss>) to document current energy usage and track anticipated savings.
- 3.5 Examples of Projects Requiring a Business Case
 - 3.5-1 POTW projects or unit process projects that achieve less than a 20% energy efficiency improvement.
 - 3.5-2 Projects implementing recommendations from an energy audit that are not otherwise designated as categorical.
 - 3.5-3 Projects that cost effectively eliminate pumps or pumping stations.
 - 3.5-4 Infiltration/Inflow (I/I) correction projects that save energy from pumping and reduced treatment costs and are cost effective.
 - 3.5-4a Projects that count toward GPR cannot build new structural capacity. These projects may, however, recover existing capacity by reducing flow from I/I.
 - 3.5-5 I/I correction projects where excessive groundwater infiltration is contaminating the influent requiring otherwise unnecessary treatment processes (i.e. arsenic laden groundwater) and I/I correction is cost effective.
 - 3.5-6 Replacing pre-Energy Policy Act of 1992 motors with National Electric Manufacturers Association (NEMA) premium energy efficiency motors.
 - 3.5-6a NEMA is a standards setting association for the electrical manufacturing industry (<http://www.nema.org/gov/energy/efficiency/premium/>).
 - 3.5-7 Upgrade of POTW lighting to energy efficient sources such as metal halide pulse start technologies, compact fluorescent, light emitting diode (LED).
 - 3.5-8 SCADA systems can be justified based upon substantial energy savings.

3.5-9 Variable Frequency Drive can be justified based upon substantial energy savings.

4.0 ENVIRONMENTALLY INNOVATIVE

-
- 4.1 Definition: Environmentally innovative projects include those that demonstrate new and/or innovative approaches to delivering services or managing water resources in a more sustainable way.
- 4.2 Categorical Projects
- 4.2-1 Total/integrated water resources management planning likely to result in a capital project.
 - 4.2-2 Utility Sustainability Plan consistent with EPA SRF's sustainability policy.
 - 4.2-3 Greenhouse gas (GHG) inventory or mitigation plan and submission of a GHG inventory to a registry (such as Climate Leaders or Climate Registry)
 - 4.3-3a Note: GHG Inventory and mitigation plan is eligible for CWSRF funding.
 - 4.2-3b EPA Climate Leaders:
 - <http://www.epa.gov/climateleaders/basic/index.html>
 - Climate Registry: <http://www.theclimateregistry.org/>
 - 4.2-4 Planning activities by a POTW to prepare for adaptation to the long-term effects of climate change and/or extreme weather.
 - 4.2-4a Office of Water – Climate Change and Water website:
 - <http://www.epa.gov/water/climatechange/>
 - 4.2.5 Construction of US Building Council LEED certified buildings or renovation of an existing building on POTW facilities.
 - 4.2-5a Any level of certification (Platinum, Gold, Silver, Certified).
 - 4.2-5b All building costs are eligible, not just stormwater, water efficiency and energy efficiency related costs. Costs are not limited to the incremental additional costs associated with LEED certified buildings.
 - 4.2-5c U.S. Green Building Council website:
 - <http://www.usgbc.org/displaypage.aspx?CategoryID=19>
 - 4.2-6 Decentralized wastewater treatment solutions to existing deficient or failing onsite wastewater systems.
 - 4.2-6a Decentralized wastewater systems include individual onsite and/or cluster wastewater systems used to collect, treat and disperse relatively small volumes of wastewater. An individual onsite wastewater treatment system is a system relying on natural processes and/or mechanical components, that is used to collect, treat and disperse or reclaim wastewater from a single dwelling or building. A cluster system is a wastewater collection and treatment system under some form of common ownership that collects wastewater from two or more dwellings or buildings and conveys it to a treatment and dispersal system located on a suitable site near the dwellings or buildings. Decentralized projects may include a combination of these systems. EPA recommends that decentralized systems be managed under a central management entity with enforceable program requirements, as stated in the *EPA Voluntary Management Guidelines*.
 - http://www.epa.gov/owm/septic/pubs/septic_guidelines.pdf

4.2-6b Treatment and Collection Options: A variety of treatment and collection options are available when implementing decentralized wastewater systems. They typically include a septic tank, although many configurations include additional treatment components following or in place of the septic tank, which provide for advanced treatment solutions. Most disperse treated effluent to the soil where further treatment occurs, utilizing either conventional soil absorption fields or alternative soil dispersal methods which provide advanced treatment. Those that discharge to streams, lakes, tributaries, and other water bodies require federal or state discharge permits (see below). Some systems promote water reuse/recycling, evaporation or wastewater uptake by plants. Some decentralized systems, particularly cluster or community systems, often utilize alternative methods of collection with small diameter pipes which can flow via gravity, pump, or siphon, including pressure sewers, vacuum sewers and small diameter gravity sewers. Alternative collection systems generally utilize piping that is less than 8 inches in diameter, or the minimum diameter allowed by the state if greater than 8 inches, with shallow burial and do not require manholes or lift stations. Septic tanks are typically installed at each building served or another location upstream of the final treatment and dispersal site. Collection systems can transport raw sewage or septic tank effluent. Another popular dispersal option used today is subsurface drip infiltration. Package plants that discharge to the soil are generally considered decentralized, depending on the situation in which they are used. While not entirely inclusive, information on treatment and collection processes is described, in detail, in the “*Onsite Wastewater Treatment Technology Fact Sheets*” section of the EPA Onsite Manual http://www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf and on EPA’s septic system website under Technology Fact Sheets. http://cfpub.epa.gov/owm/septic/septic.cfm?page_id=283

4.3 Projects That Do Not Meet the Definition of Environmentally Innovative

- 4.3-1 Air scrubbers to prevent nonpoint source deposition.
- 4.3-2 Facultative lagoons, even if integral to an innovative treatment processes.
- 4.3-3 Surface discharging decentralized wastewater systems where there are cost effective soil-based alternatives.
- 4.3-4 Higher sea walls to protect POTW from sea level rise.
- 4.3-5 Reflective roofs at POTW to combat heat island effect.

4.4 Decision Criteria for Business Cases

- 4.4-1 State programs are allowed flexibility in determining what projects qualify as innovative in their state based on unique geographical or climatological conditions.
 - 4.4-1a Technology or approach whose performance is expected to address water quality but the actual performance has not been demonstrated in the state;

- 4.4-1b Technology or approach that is not widely used in the State, but does perform as well or better than conventional technology/approaches at lower cost; or
 - 4.4-1c Conventional technology or approaches that are used in a new application in the State.
-

4.5 Examples of Projects Requiring a Business Case

- 4.5-1 Constructed wetlands projects used for municipal wastewater treatment, polishing, and/or effluent disposal.
 - 4.5-1a Natural wetlands, as well as the restoration/enhancement of degraded wetlands, may not be used for wastewater treatment purposes and must comply with all regulatory/permitting requirements.
 - 4.5-1b Projects may not (further) degrade natural wetlands.
- 4.5-2 Projects or components of projects that result from total/integrated water resource management planning consistent with the decision criteria for environmentally innovative projects and that are Clean Water SRF eligible.
- 4.5-3 Projects that facilitate adaptation of POTWs to climate change identified by a carbon footprint assessment or climate adaptation study.
- 4.5-4 POTW upgrades or retrofits that remove phosphorus for beneficial use, such as biofuel production with algae.
- 4.5-5 Application of innovative treatment technologies or systems that improve environmental conditions and are consistent with the Decision Criteria for environmentally innovative projects such as:
 - 4.5-5a Projects that significantly reduce or eliminate the use of chemicals in wastewater treatment;
 - 4.5-5b Treatment technologies or approaches that significantly reduce the volume of residuals, minimize the generation of residuals, or lower the amount of chemicals in the residuals. (National Biosolids Partnership, 2010; *Advances in Solids Reduction Processes at Wastewater Treatment Facilities Webinar*; [http://www.e-wef.org/timssnet/meetings/tnt_meetings.cfm?primary_id=10CAP2&Action=LONG&subsystem=ORD%3cbr\).](http://www.e-wef.org/timssnet/meetings/tnt_meetings.cfm?primary_id=10CAP2&Action=LONG&subsystem=ORD%3cbr).)
 - 4.5-5b(i) Includes composting, class A and other sustainable biosolids management approaches.
- 4.5-6 Educational activities and demonstration projects for water or energy efficiency.
- 4.5-7 Projects that achieve the goals/objectives of utility asset management plans (http://www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_assetmanagement_bestpractices.pdf; <http://www.epa.gov/owm/assetmanage/index.htm>).
- 4.5-8 Sub-surface land application of effluent and other means for ground water recharge, such as spray irrigation and overland flow.
 - 4.5-8a Spray irrigation and overland flow of effluent is not eligible for GPR where there is no other cost effective alternative.

Business Case Development

This guidance is intended to be comprehensive: however, EPA understands our examples projects requiring a business case may not be all inclusive. A business case is a due diligence document. For those projects, or portions of projects, which are not included in the categorical projects lists provided above, a business case will be required to demonstrate that an assistance recipient has thoroughly researched anticipated ‘green’ benefits of a project. Business cases will be approved by the State (see section III.A. in the *Procedures for Implementing Certain Provisions of EPA’s Fiscal Year 2011 Full-Year Continuing Appropriation Affecting the Clean Water and Drinking Water State Revolving Fund Programs*). An approved business case must be included in the State’s project files and contain clear documentation that the project achieves identifiable and substantial benefits. The following sections provide guidelines for business case development.

5.0 Length of a Business Case

- 5.0-1 Business cases must address the decision criteria for the category of project
- 5.0-2 Business cases should be adequate, but not exhaustive.
 - 5.0-2a There are many formats and approaches. EPA does not require any specific one.
 - 5.0-2b Some projects will require detailed analysis and calculations, while others many not require more than one page.
 - 5.0-2c Limit the information contained in the business case to only the pertinent ‘green’ information needed to justify the project.
- 5.0-3 A business case can simply summarize results from, and then cite, existing documentation – such as engineering reports, water or energy audits, results of water system tests, etc.

5.1 Content of a Business Case

- 5.1-1 Quantifiable water and/or energy savings or water loss reduction for water and energy efficiency projects should be included.
- 5.1-2 The cost and financial benefit of the project should be included, along with the payback time period where applicable. (NOTE: Clean Water SRF requires energy efficiency projects to be cost effective.)

5.2 Items Which Strengthen Business Case, but Are Not Required

- 5.2-1 Showing that the project was designed to enable equipment to operate most efficiently.
- 5.2-2 Demonstrating that equipment will meet or exceed standards set by professional associations.
- 5.2-3 Including operator training or committing to utilizing existing tools such as Energy Star’s Portfolio Manager or CUPSS for energy efficiency projects.

5.3 Example Business Cases Are Available at <http://www.srfbusinesscases.net/>.

LATERAL SEWER STUDY AREA NUMBER 1 OF KILL CREEK NUMBER 2 SEWER SERVICE EVALUATION

FACILITY PLAN

SRF PROJECT NUMBER C20 1920 01

PREPARED FOR:
JOHNSON COUNTY WASTEWATER



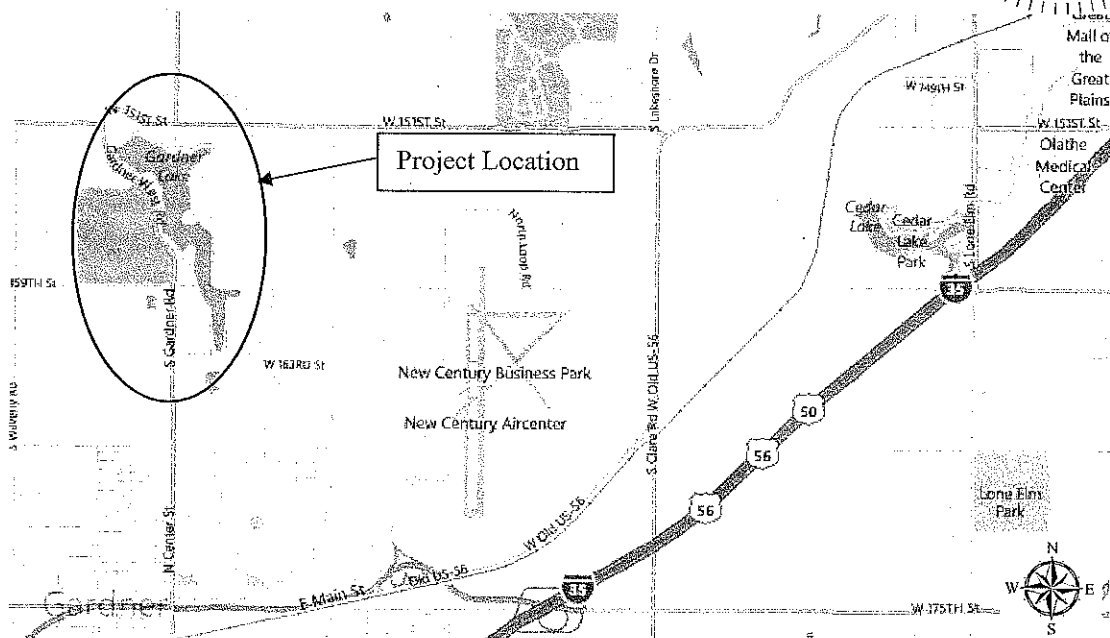
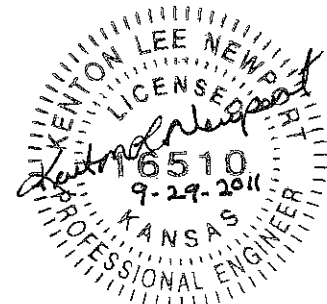
PREPARED BY:
HDR ENGINEERING



RECEIVED

OCT 04 2011

BUREAU OF WATER



September 29, 2011

RECEIVED

OCT 04 2011

BUREAU OF WATER

Mr. Gordon Rames, PE
Project Manager, JCW
11811 South Sunset Drive
Suite 2500
Olathe, KS 66061

Re: Lateral Sewer Study Area Number 1 of Kill Creek Number 2 Facility Plan

HDR Engineering, Inc. is pleased to submit the Final Facility Plan for the Lateral Sewer Study Area Number 1 of Kill Creek Number 2 Sewer Service Evaluation (near Gardner Lake). The Facility Plan evaluated replacing septic tanks and holding tanks in the proposed benefit district with holding tanks or low pressure sewers. The proposed benefit district contains 344 buildable lots, of which 272 have existing houses. The proposed benefit district would serve the residences between 151st Street (on the north) and 163rd Street (on the south), and a half mile on either side of Gardner Road.

The septic tanks can negatively impact the watershed, according to Kansas Department of Health and Environment. According to the Johnson County Sanitary Code, the residences in the area are built on lots which today would be too small for a septic tank and lateral field. Many of these septic tanks and lateral fields are also within 200 feet of the lake, which does not conform to the current code. The sewers are also aging and many failures (15) have been reported in the proposed benefit district. In addition, the soil conditions are not conducive for septic treatment and bedrock is found only 1-3 feet below the surface in many areas. KDHE has identified two water quality impairments for Gardner Lake - Low Dissolved Oxygen and Eutrophication. The TMDL lists septic tanks in the watershed as possible sources of the pollutants.

In the case of Alternative 2, the estimated flow from the proposed benefit district would be approximately 88,800 gallons per day with a maximum peak instantaneous flow of 165 gallons per minute. This flow would be conveyed to the Kill Creek Number 1 Pump Station. The Kill Creek Number 1 Pump Station would convey the wastewater via a 12-inch forcemain to the New Century Air Center Wastewater Treatment Plant. Each of these facilities was evaluated and determined to have adequate capacity for the proposed benefit district addition.

Two alternatives were evaluated to serve the proposed district - installing holding tanks at each property and low pressure sewers. Holding tanks would be installed at each property at a lower capital cost than Alternative 2. However, holding tanks require frequent pumpouts (two per house per month), which becomes very costly in the long-term. The low pressure sewer alternative would serve each of the homes with grinder pumps, lateral benefit district lines, and CMSD mains. Alternative 2 has a higher capital cost, but a much lower operating cost. The capital, operation and maintenance, and life cycle costs for each alternative are presented in Table 1. Low pressure sewers had higher capital costs, but had significantly lower operation and maintenance and net present worth costs over a 20 year period, and are thus recommended for this area.

Table 1 – Capital, Operation and Maintenance, and Life Cycle Cost Comparison

Alternative	Total Capital Cost	Present Worth Operation and Maintenance Cost	Net Present Cost
Alternative 1 - Holding Tanks	\$3,486,800	\$17,496,100	\$20,982,900
Alternative 2 - Low Pressure Sewers	\$9,120,500	\$887,100	\$10,007,600

This project is to be financed through the Kansas State Revolving Fund and has qualified for the Green Project Reserve, which allows for 40% principle forgiveness. With this funding, a homeowner who connects to the system in the area will pay approximately \$1,181 per year for 20 years for the project (this includes the grinder pump, low pressure mains, and connection fees). A resident who does not connect could expect to pay approximately \$275 per year.

Please let me know if you have any questions or concerns regarding this report.

Sincerely,



Kenton L. Newport, PE
Project Manager
HDR Engineering, Inc.

I. Introduction and Background

This Kill Creek Number 2 Lateral Sewer Study Area Number 1 Sewer Service Evaluation establishes the preliminary design criteria and costs for the sewer system that will serve a proposed benefit district serving residences surrounding Gardner Lake in Johnson County, Kansas. Gardner Lake is located primarily between 151st Street (on the north) and 163rd Street (on the south), and a half mile on either side of Gardner Road. Figure 1 shows a map of the proposed benefit district.

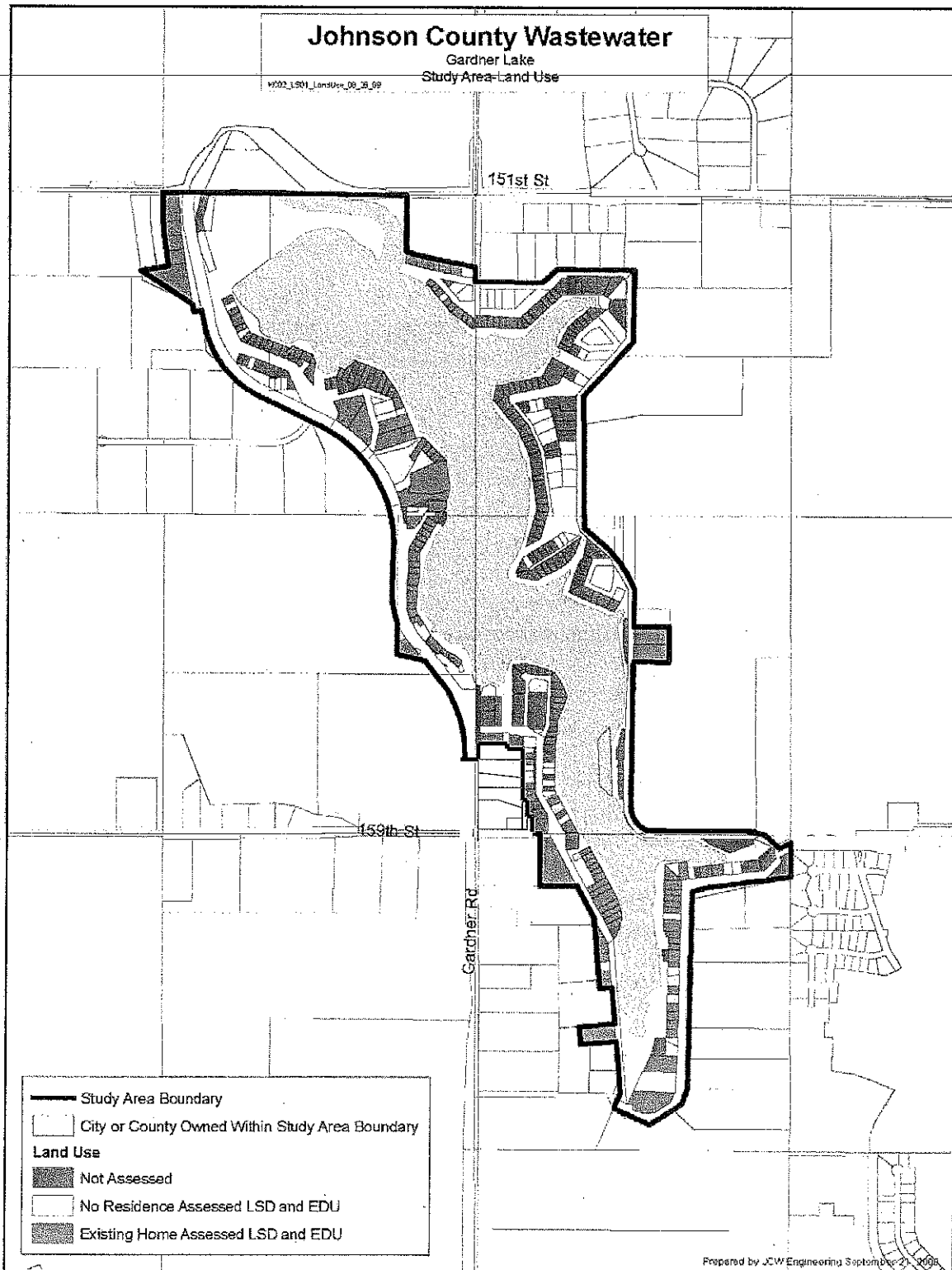
Gardner Lake was built by the Federal Government from 1935-1938 as both a public water supply source and a recreational lake. Most of the dwellings along the lake were constructed in the 1940's and 1950's, however new construction has also occurred within the past 10 years. Based on JCW's and Johnson County's Planning Department analysis, using existing lot sizes and planning codes, there are 344 buildable properties in the proposed benefit district. Of these, 272 currently have a dwelling on the property (72 vacant lots). This equates to approximately 888 potential residents when Johnson County's system average of 2.58 residents per home is applied to all of the buildable properties. JCW and Johnson County's Planning Department determined that there are approximately 59 properties in the study area that are not buildable, because of the small size of the lot or inadequate access to a roadway. These lots will not be considered in this study.

This document describes the purpose of the proposed benefit district's creation; the expected wastewater flows; the existing infrastructure; the wastewater collection system; the capital, operation and maintenance, and life cycle costs for each alternative; and the recommended alternative.

II. Purpose and Statement of Environmental Impact

The purpose of this project is to provide sewer service to homes and buildings with existing septic systems, many of which are inadequate and may be negatively impacting the water quality of Gardner Lake, with a centralized collection system. A gravity system will not be considered in this study due to the topography of the area. The residences in the area are located along the lake at the lowest elevations in the study area. Gravity sewer lines would need to run along the roadways, which are at higher elevations than the homes. Thus, the gravity sewer lines would need to be excessively deep to serve the lakeside homes. Laying gravity sewers at excessive depth becomes cost prohibitive, especially when rock is present. This study area has a significant quantity of rock, which is described in greater detail in Section III.

Figure 1 – Map of the Gardner Lake Proposed Benefit District



The homes in the proposed benefit district are built on small lots, many of which are within 100 feet of the lake, and have aging septic systems. The homes in the proposed benefit district were built on small lots (average of 0.11 acres) which are not conducive for service by a septic tank and lateral field. For example, the minimum lot size allowed by the most recent issue of the Johnson County Sanitary Code (2004) states that 2.0 acres is the minimum acceptable lot size. According to Soil Conservation Service maps, the main soil type around Gardner Lake is Sogn/Vinland Complex. These soils provide minimal absorption and treatment of septic tank effluent and can allow sewage to surface during periods of high groundwater elevation or high water use by the homeowner. In addition, the soil is only 1 to 3 feet to bedrock, allowing minimally treated septic tank effluent to run along the bedrock to the lake.

Many of the septic systems are located in the residences backyards, adjacent to the lake. The Johnson County Environmental Department (JCED) and the Kansas Department of Health and Environment (KDHE) require that failing septic systems be replaced with a holding tank when any part of the system (including the lateral field) is within 50 feet of surface water; however, KDHE recommends 100 feet of setback (KDHE Bulletin 4-2, March 1997, Table 5). KDHE requires 100 feet of setback distance if the waterbody serves as a public water supply, but recommends 200 feet. Although the City of Gardner ceased using Gardner Lake for this purpose in 2005, there are plans to use Gardner Lake as an alternate water supply for the City in the future. Thus, the recommended 200 foot setback distance should be applied. In fact, Johnson County's Environmental Department (JCED) has, and continues to enforce, the requirement and recommendation to install a holding tank where septic tanks fail or new buildings are built where the property is within 200 feet of the lake. It is likely that many of the existing septic systems do not meet this required setback distance.

The septic systems are also aging. Johnson County started a program in 2004 which makes it mandatory for all homes on septic systems to have a septic inspection upon the sale of the property. From 2008 to the present, there have been a total of 15 failures found through complaints or the resale inspection program in this proposed district. In cases of failure, the homeowner is then required to repair their existing septic system or replace it with a holding tank if the property is less than 200 feet from the water's edge.

KDHE has identified two water quality impairments for Gardner Lake based on its own sampling programs, low dissolved oxygen (DO) and eutrophication. As a result of these impairments, KDHE developed total maximum daily loads (TMDL's) for Gardner Lake in January 2000. KDHE reported that low dissolved oxygen is due to the accumulation of organic material at the lower depths of the lake because of the eutrophic state of the lake. The TMDL presents a goal of 5 mg/L of dissolved oxygen through 80% of the water column (beginning at the lake surface and ending above the lake floor). Currently, the lake has 8 mg/L of DO at the surface and 0 mg/L of DO on the floor. KDHE included the septic systems around Gardner Lake as a possible source of the impairment in their "Source Inventory and Assessment" and noted that the septic systems will be eventually transferred over to a centralized collection system.

The TMDL for eutrophication attributes the moderate levels of phosphorus (the lake has a 14.6 Total Nitrogen/Total Phosphorus (TN/TP) ratio, and ratios greater than 12 suggest TP is likely the limiting nutrient) as the key cause of the eutrophic state of the lake. According to the report, the Trophic State Index (TSI), a 100 point based system for ranking the biological activity in the lake, Gardner Lake scored a 60.1, which places the lake in a category of "Very Eutrophic". Very eutrophic lakes have high biological activity, but can still meet their intended uses. When a lake reaches a TSI rating of 64 it is considered hypereutrophic, and is not likely to meet its intended uses. Because Gardner Lake is categorized as very eutrophic, and is at risk to become hypereutrophic, it is a high priority for implementation of improvements.

The TMDL for eutrophication points to three different areas of non-point source pollution: pollutants from agricultural fertilizer runoff, pollutants from urban stormwater, and pollutants from septic system failure. The TMDL implementation plan calls for inspecting and replacing failing septic systems near streams. Installation of sewers for homes and buildings currently served by septic systems would likely reduce the nutrients, which are causing the lake impairments, and would improve the quality of Gardner Lake.

Gardner Lake and the proposed benefit district are located in the Lower Kansas Subbasin, which, according to KDHE, has a Unified Watershed Assessment Priority Ranking of 1 - Highest Priority for restoration work.

The proposed benefit district is being considered in response to a petition from the landowners within the area requesting its creation. In Johnson County, benefit districts are formed to finance public sewer projects. A benefit district can be created when owners of 51% of the land area petition for its creation. This criterion has been met for this district as the petition was signed by owners of 66.2% of the land area in the proposed benefit district.

Figure 2 – Proposed Benefit District and Existing Infrastructure

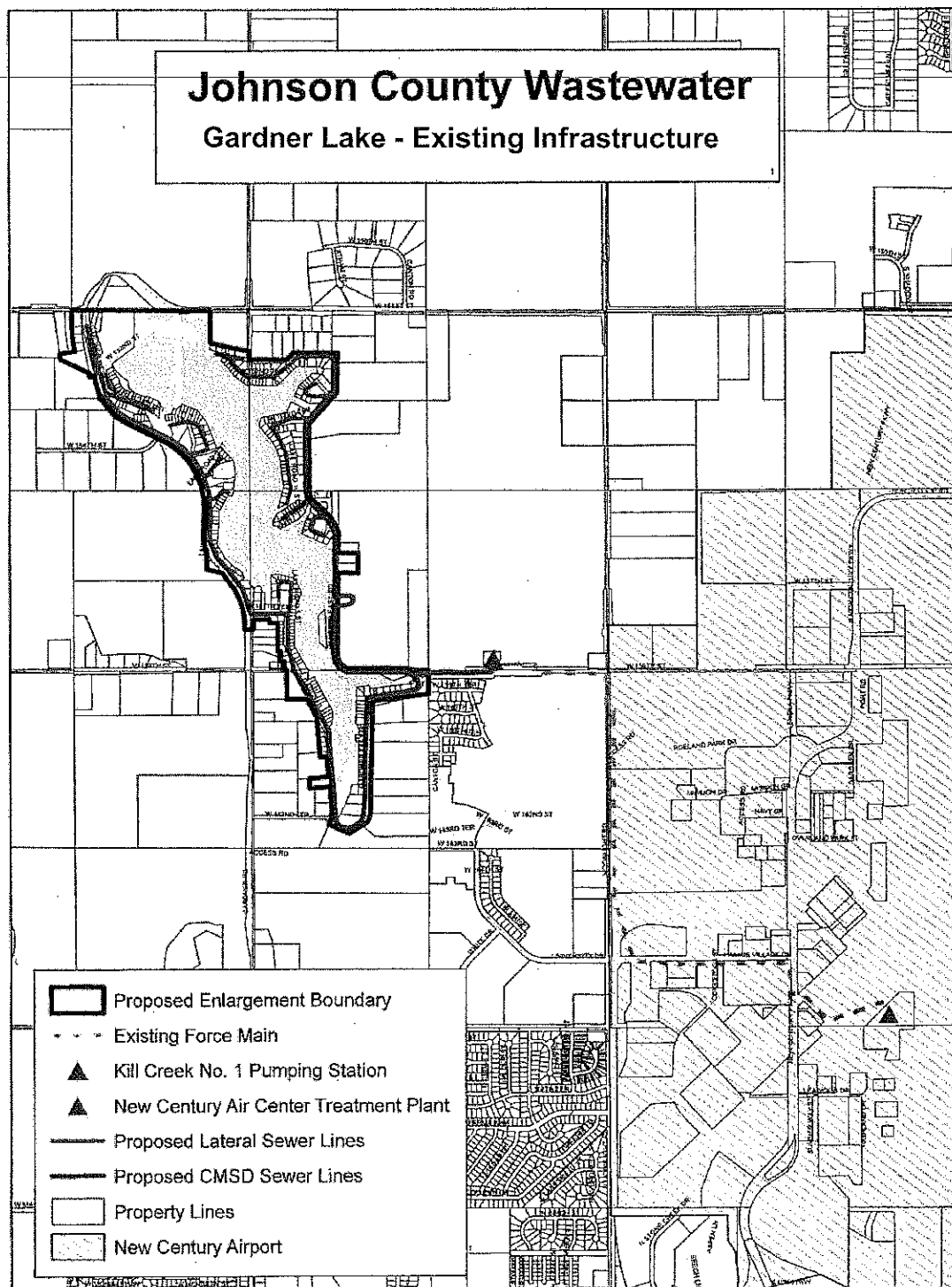
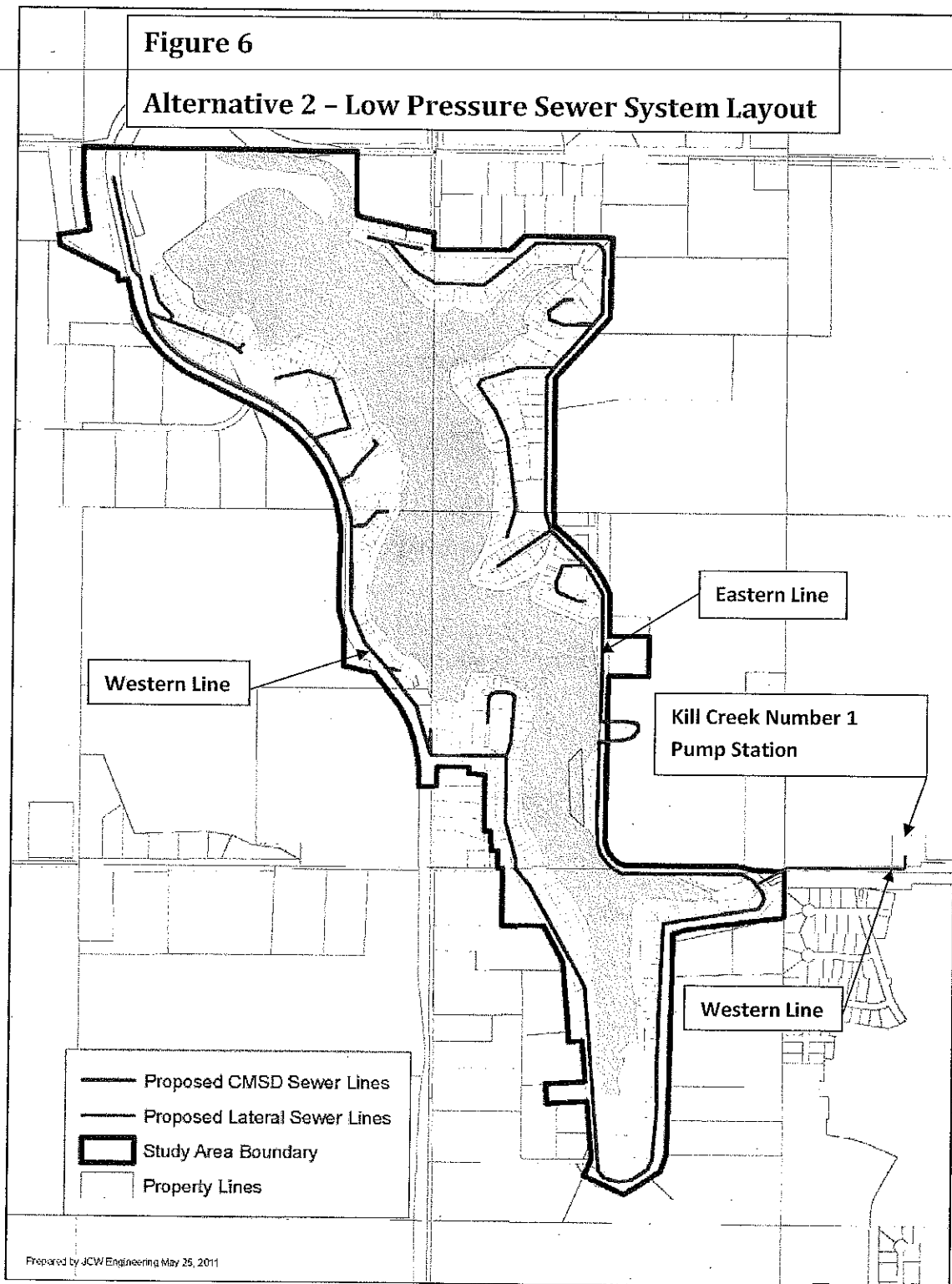
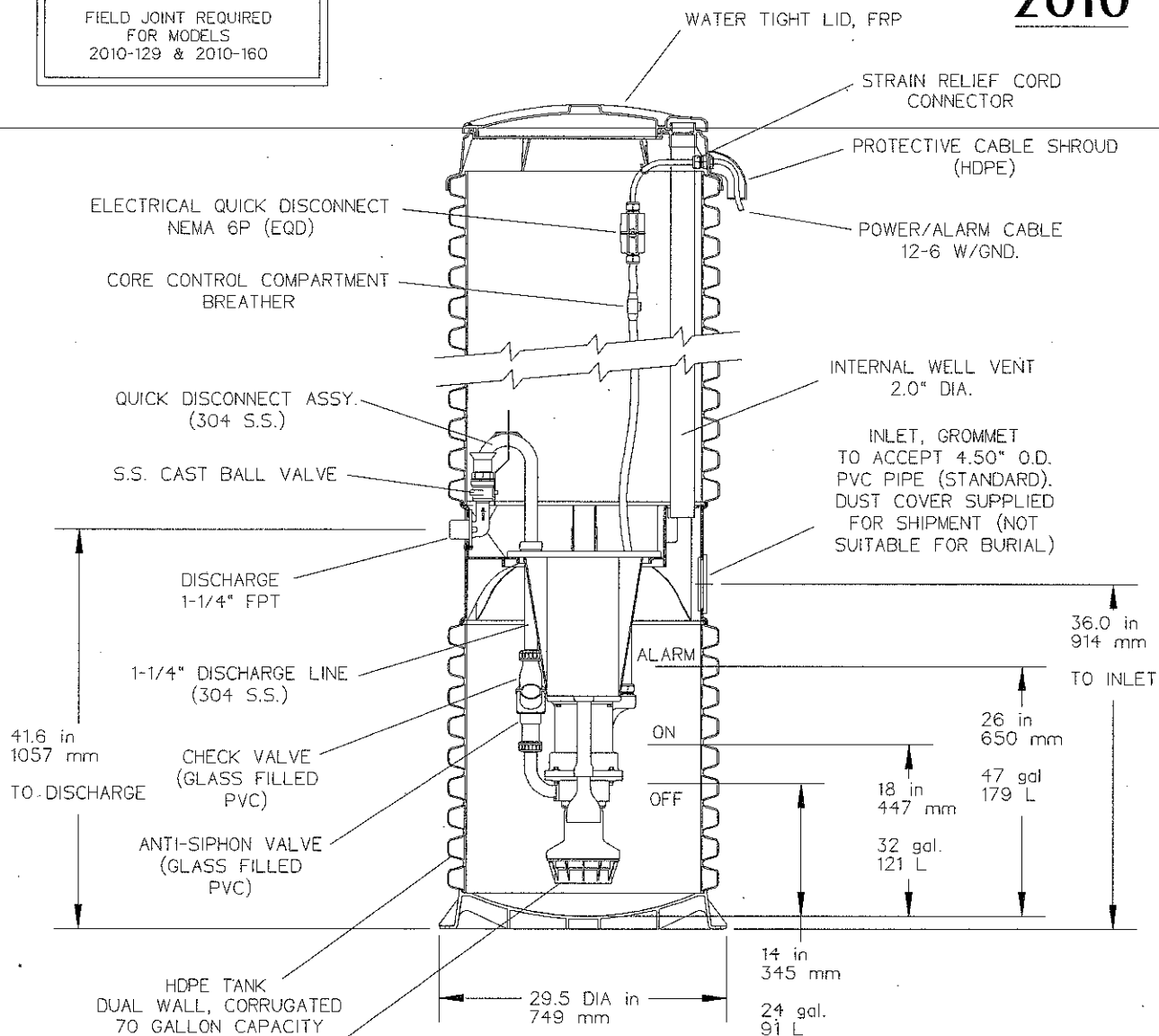


Figure 6 - Alternative 2 - Low Pressure Sewer System Layout



2010

FIELD JOINT REQUIRED
FOR MODELS
2010-129 & 2010-160



BALLAST REQUIREMENTS

A CONCRETE ANCHOR IS REQUIRED ON ALL OUTDOOR MODEL 2010 STATIONS
SPECIFIC CONCRETE DIMENSIONS ARE REQUIRED TO ACHIEVE NECESSARY BALLAST EFFECT
SEE INSTALLATION INSTRUCTIONS FOR FURTHER DETAILS



SGS	CAH	01/10/02	H	1/16
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eone
SEWER SYSTEMS

MODEL 2010, DETAIL SHEET

PA0908P01

KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Gardner Lake
Water Quality Impairment: Dissolved Oxygen

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Lower Kansas River

County: Johnson

HUC 8: 10270104

HUC 11: 140 (Kill Creek Watershed)

Drainage Area: Approximately 5 square miles.

Conservation Pool: Area 70 Acres, maximum depth 11 meters

Designated Uses: Primary & Secondary Contact Recreation; Domestic Water Supply;
Aquatic Life Support

1998 303d Listing: Table 4 - Water Quality Limited Lakes

Impaired Use: Aquatic Life Support

Water Quality Standard: Dissolved Oxygen: 5 mg/L (KAR 28-16-28e(c)(2)(A))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 303d: Not Supporting

Monitoring Sites: Station 040401 in Gardner Lake.

Period of Record Used: Four previous surveys—1985, 1988, 1993, & 1998

Current Condition: In Gardner Lake, the dissolved oxygen concentration decreases with increased depth. (See attached table). At the surface, the concentration was approximately 8 mg/L, a sufficient amount of dissolved oxygen for aquatic life support. However, near the bottom of the lake, the concentration dropped to 0 mg/L in all surveys. The low dissolved oxygen concentrations are due to the accumulation of organic material in the lower depths resulting from lake productivity reflective of its slightly eutrophic state.

Desired Endpoints of Water Quality at Gardner Lake over 2004 - 2008:

In order to reflect the benefits of improving the trophic condition of the lake from its current eutrophic status, the desired endpoint will be dissolved oxygen levels at or above 5 mg/l over 80% of the water column. This endpoint reflects the likelihood that some lower oxygen values are to be expected in the lake depths close to the bottom, but artificial sources of nutrients will be reduced to lower algal productivity, measured by chlorophyll a in order to maximize the volume of the lake which will have adequate summer oxygen levels. Refined endpoints will be developed in 2004 to reflect additional sampling and artificial source assessment and confirmation of impaired status of lake.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: To determine the causes of the dissolved oxygen impairment, factors that contribute to eutrophication (such as phosphorus and organic wastes) need to be assessed. The primary source of phosphorus within Gardner City Lake is probably runoff from agricultural lands in the Kill Creek watershed where phosphorus has been applied. Land use coverage analysis indicates 32% of the watershed is in cropland.

Population density is high, 225 people per square mile. Fifteen percent of the watershed is urban. Urban stormwater may be a contributor to the placement of phosphorus into the lake. Urbanization of the county is projected to continue to the year 2020. With the rising populations, the acreage devoted to suburban homes and businesses will increase. Fertilizer applications to lawns will increase in response to this change. An annual phosphorus load of 2,456 pounds per year is necessary to correspond to the concentrations seen in the lake.

Houses around lake are on septic systems. At some point in the future, Gardner will likely put these homes into their collector system. Johnson County continues to have a large number of on-site waste systems established, inspections or investigations of such systems routinely number over 300 per year in the county.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

Point Sources: Since this impairment is primarily associated with agricultural and urban non-point source pollution, there will be no Wasteload Allocation assigned to point sources for nutrients under this TMDL.

Non-Point Sources: Water quality violations are predominantly due to non-point source pollution. Background levels may be attributed to geological sources. The assessment suggests that cropland and urban areas throughout the watershed contribute to the eutrophic state of the lake and thus to the low dissolved oxygen levels. Given the runoff characteristics of the

watershed, overland runoff can easily carry phosphorus into the lake. Septic systems around the lake also contribute to nutrient loading. Generally a Load Allocation of 950 pounds per year, leading to a 57% reduction in available phosphorus is necessary to reach the endpoint.

Defined Margin of Safety: The margin of safety provides some hedge against the uncertainty of variable annual total phosphorus loads and the dissolved oxygen endpoint. Therefore, the margin of safety will be 106 pounds per year of total phosphorus taken from the load capacity to ensure that adequate load reduction occurs to meet the endpoint.

State Water Plan Implementation Priority: Because this lake has a domestic water supply function and is associated with other TMDLs regarding the water quality of Kill Creek subwatershed and because of the need to comprehensive package implementation measures to handle multiple pollutants in the agricultural setting, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Kansas Subbasin (HUC 8: 10270104) with a priority ranking of 1 (Highest Priority for restoration work).

Priority HUC 11s: The entire watershed is within HUC 11 (140) of Kill Creek.

5. IMPLEMENTATION

Desired Implementation Activities

Projections indicate that full use support could be achieved through watershed-wide BMPs for agriculture, plus attending to septic systems around the lake. Some of the recommended agricultural practices are as follows:

1. Implement soil sampling to recommend appropriate fertilizer applications on cropland
2. Maintain conservation tillage and contour farming to minimize cropland erosion.
3. Install grass buffer strips along streams.
4. Reduce activities within riparian areas
5. Implement nutrient management plans to manage manure application to land

Implementation Programs Guidance

Non-Point Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities as well as nutrient management.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.
- c. Provide technical assistance on nutrient management in vicinity of streams.

- d. Guide federal programs such as the Environmental Quality Improvement Program, which are dedicated to priority subbasins through the Unified Watershed Assessment, to priority subwatersheds and stream segments within those subbasins identified by this TMDL.
-

Local Environmental Protection Program - KDHE

- a. Support inspection of on-site wastewater systems to minimize nutrient loadings

Water Resource Cost Share & Non-Point Source Pollution Control Programs - SCC

- a. Apply conservation farming practices, including terraces and waterways, sediment control basins, and constructed wetlands.
- b. Provide sediment control practices to minimize erosion and sediment and nutrient transport
- c. Provide livestock waste management systems for proper manure storage, disposal and land application.
- d. Repair failing septic systems in proximity to streams
- e. Coordinate with USDA/NRCS Environmental Quality Improvement Program in providing educational, technical and financial assistance to agricultural producers.

Riparian Protection Program - SCC

- a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.
- b. Develop riparian restoration projects
- c. Promote wetland construction to assimilate nutrient loadings

Buffer Initiative Program - SCC

- a. Install grass buffer strips near streams.
- b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

- a. Educate agricultural producers on sediment and nutrient management
- b. Provide technical assistance on buffer strip design and minimizing cropland runoff
- c. Encourage annual soil testing to determine capacity of field to hold phosphorus

Timeframe for Implementation: Pollution reduction practices should be installed within the lake drainage during the years 2000-2004.

Targeted Participants: Primary participants for implementation will be agricultural producers and homeowners operating within the drainages of the lake. Implemented activities should be targeted at those areas with greatest potential to impact the lake. Nominally, this would be activities located within one mile of the streams including:

1. Total rowcrop acreage
2. Cultivation alongside lake
3. Fields with manure applications

Some inventory of local needs should be conducted in 2000 to identify such activities. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal activities influencing the quality of the streams in the watershed during the implementation period of this TMDL.

Milestone for 2004: The year 2004 marks the mid-point of the ten year implementation window for the watershed. At that point in time, milestones should be reached which will have at least eighty percent of the producers responsible for the land use activities cited in the local assessment participating in the implementation programs provided by the state. Additionally, sampled data from Gardner City Lake should indicate evidence of reduced phosphorus levels in the conservation pool elevations relative to the conditions seen over 1988-1998.

Delivery Agents: Depending upon confirmation of impairment and assessment of probable sources, the primary delivery agents for program participation will be county and city officials.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollution.

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Effectiveness: Nutrient control has been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips as well as runoff control around animal feeding operations. The key to success will be widespread utilization of conservation farming and waste management within the watersheds cited in this TMDL.

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KDHE will collect nutrient, dissolved oxygen and chlorophyll a samples from Gardner City Lake in 2001 and 2003. Additional data, to establish nutrient ratios, source loading and further determine mean summer lake trophic condition, would be of value prior to 2004. Further sampling and evaluation should occur in 2005 and 2007..

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Milestone Evaluation: In 2004, evaluation will be made as to the degree of implementation which has occurred within the drainage and current condition of Gardner City Lake. Subsequent decisions will be made regarding implementation approach, follow up of additional implementation and implementation in the non-priority subwatersheds.

Consideration for 303d Delisting: Gardner City Lake will be evaluated for delisting under Section 303d, based on the monitoring data over the period 2004-2008. Therefore, the decision for delisting will come about in the preparation of the 2008 303d list. Should modifications be made to the applicable water quality criteria during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2002 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2000-2004.

Approved January 26, 2000.

KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Gardner Lake
Water Quality Impairment: Eutrophication

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Lower Kansas River

County: Johnson

HUC 8: 10270104

HUC 11: 140 (Kill Creek Watershed)

Drainage Area: Approximately 5 square miles.

Conservation Pool: Area 70 Acres, maximum depth 11 meters

Designated Uses: Primary & Secondary Contact Recreation; Domestic Water Supply; Aquatic Life Support

1998 303d Listing: Table 4 - Water Quality Limited Lakes

Impaired Use: All uses are impaired to a degree by eutrophication

Water Quality Standard: Nutrients - Narrative: The introduction of plant nutrients into streams, lakes, or wetlands from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life. (KAR 28-16-28e(c)(2)(B)).

The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent the development of objectionable concentrations of algae or algal by-products or nuisance growths of submersed, floating, or emergent aquatic vegetation. (KAR 28-16-28e(c)(7)(A)).

Dissolved Oxygen: 5 mg/L (KAR 28-16-28e(c)(2)(A))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 303d: Not Supporting

Level of Eutrophication: Eutrophic - Trophic State Index = 60.1

Monitoring Sites: Station 040401 in Gardner Lake.

Period of Record Used: Four previous surveys—1988, 1989, 1993, & 1998

Current Condition: The lake has elevated chlorophyll a concentrations during summer months, average concentration is 20.2 ppb, with an associated Trophic State Index of 60.1, indicative of very eutrophic conditions. Total phosphorus data tend to be elevated (average of 47.4 ppb). Fifty percent of the samples taken from the lake were at or over 100 ppb. Phosphorus is the primary limiting factor (TN/TP = 14.6, >12 indicates phosphorus is more important). Low-to-moderate inorganic turbidity, but adequate light within the water column. Chlorophyll-to-phosphorus yield is high.

The Trophic State Index of 60.1 is derived from the chlorophyll a concentration. Trophic state assessments of potential algal productivity were made based on chlorophyll a concentrations, nutrient levels and values of the Carlson Trophic State Index (TSI). Generally, some degree of eutrophic conditions are seen with chlorophyll a concentrations over 12 ug/l and hypereutrophy occurs at levels over 20 ug/l. The Carlson TSI, derives from the chlorophyll concentrations and scales the trophic state as follows:

1. Oligotrophic	TSI < 40
2. Mesotrophic	TSI: 40 - 49.99
3. Slightly Eutrophic	TSI: 50 - 54.99
4. Fully Eutrophic	TSI: 55 - 59.99
5. Very Eutrophic	TSI: 60 - 63.99
6. Hypereutrophic	TSI: ≥ 64

In Gardner Lake, the dissolved oxygen concentration decreases with increased depth. (See attached table). At the surface, the concentration was approximately 8 mg/L, a sufficient amount of dissolved oxygen for aquatic life support. However, near the bottom of the lake, the concentration dropped to 0 mg/L in all surveys. The low dissolved oxygen concentrations are due to the accumulation of organic material in the lower depths resulting from lake productivity reflective of its slightly eutrophic state.

Desired Endpoints of Water Quality at Gardner City Lake over 2004 - 2008:

In order to improve the trophic condition of the lake from its current very eutrophic status, the desired endpoint will be summer chlorophyll a concentrations at or below 12 ug/l, corresponding to a trophic state of slightly eutrophic conditions by 2008. Achievement of this endpoint should also result in higher concentrations of dissolved oxygen in the water column of the lake. Refined endpoints will be developed in 2004 to reflect additional sampling and artificial source assessment and confirmation of impaired status of lake.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: The primary source of phosphorus within Gardner City Lake is probably runoff from agricultural lands in the Kill Creek watershed where phosphorus has been applied. Land use coverage analysis indicates 32% of the watershed is in cropland. No point sources are present within the lake's drainage.

Fertilizer applications to lawns within the drainage and stormwater delivery to the lake are probably primary loading sources. Population density is high, 225 people per square mile. Fifteen percent of the watershed is urban. Urbanization of the county is projected to continue to the year 2020. An annual phosphorus load of 2450.8 pounds per year is necessary to correspond to the concentrations seen in the lake.

Houses around lake are on septic systems. At some point in the future, Gardner will likely put these homes into their collector system. Johnson County continues to have a large number of on-site waste systems established, inspections or investigations of such systems routinely number over 300 per year in the county.

Background Levels: Nutrient recycling from the sediments in the lake is likely contributing available phosphorus to the lake for algal uptake.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

More detailed assessment of sources and confirmation of the trophic state of the lake must be completed before detailed allocations can be made. The general inventory of sources within the drainage does provide some guidance as to areas of load reduction.

Point Sources: Since this impairment is primarily associated with agricultural and urban non-point source pollution, there will be no Wasteload Allocation assigned to point sources for nutrients under this TMDL.

Non-Point Sources: Water quality violations are predominantly due to non-point source pollution. Background levels may be attributed to nutrient recycling. The assessment suggests that cropland and urban areas throughout the watershed contribute to the eutrophic state of the lake. Given the runoff characteristics of the watershed, overland runoff can easily carry phosphorus into the lake. Septic systems around the lake also contribute to nutrient loading. Generally a Load Allocation of 945 pounds per year, leading to a 57% reduction in available phosphorus is necessary to reach the endpoint.

Defined Margin of Safety: The margin of safety provides some hedge against the uncertainty of variable annual total phosphorus loads and the chlorophyll a endpoint. Therefore, the margin of safety will be 105 pounds per year of total phosphorus taken from the load capacity to ensure that adequate load reduction occurs to meet the endpoint.

State Water Plan Implementation Priority: Because this lake has a domestic water supply function and is associated with other TMDLs regarding the water quality of Kill Creek subwatershed and because of the need to comprehensive package implementation measures to handle multiple pollutants in the agricultural setting, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Kansas Subbasin (HUC 8: 10270104) with a priority ranking of 1 (Highest Priority for restoration work).

Priority HUC 11s: The entire watershed is within HUC 11 (140) of Kill Creek.

5. IMPLEMENTATION

Desired Implementation Activities

Projections indicate that full use support could be achieved through watershed-wide BMPs for agriculture, plus attending to septic systems around the lake. Some of the recommended agricultural practices are as follows:

1. Implement soil sampling to recommend appropriate fertilizer applications on cropland
2. Maintain conservation tillage and contour farming to minimize cropland erosion.
3. Install grass buffer strips along streams.
4. Reduce activities within riparian areas
5. Implement nutrient management plans to manage manure application to land

Implementation Programs Guidance

Non-Point Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities as well as nutrient management.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.
- c. Provide technical assistance on nutrient management in vicinity of streams.
- d. Guide federal programs such as the Environmental Quality Improvement Program, which are dedicated to priority subbasins through the Unified Watershed Assessment, to priority subwatersheds and stream segments within those subbasins identified by this TMDL.

Local Environmental Protection Program - KDHE

- a. Support inspection of on-site wastewater systems to minimize nutrient loadings

Water Resource Cost Share & Non-Point Source Pollution Control Programs - SCC

- a. Apply conservation farming practices, including terraces and waterways, sediment control basins, and constructed wetlands.
- b. Provide sediment control practices to minimize erosion and sediment and nutrient transport
- c. Provide livestock waste management systems for proper manure storage, disposal and land application.
- d. Repair failing septic systems in proximity to streams
- e. Coordinate with USDA/NRCS Environmental Quality Improvement Program in providing educational, technical and financial assistance to agricultural producers.

Riparian Protection Program - SCC

- a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.
- b. Develop riparian restoration projects
- c. Promote wetland construction to assimilate nutrient loadings

Buffer Initiative Program - SCC

- a. Install grass buffer strips near streams.
- b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

- a. Educate agricultural producers on sediment and nutrient management
- b. Provide technical assistance on buffer strip design and minimizing cropland runoff
- c. Encourage annual soil testing to determine capacity of field to hold phosphorus

Timeframe for Implementation: Pollution reduction practices should be installed within the lake drainage during the years 2000-2004.

Targeted Participants: Primary participants for implementation will be agricultural producers and homeowners operating within the drainages of the lake. Implemented activities should be targeted at those areas with greatest potential to impact the lake. Nominally, this would be activities located within one mile of the streams including:

- 1. Total rowcrop acreage
- 2. Cultivation alongside lake
- 3. Fields with manure applications

Some inventory of local needs should be conducted in 2000 to identify such activities. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal activities influencing the quality of the streams in the watershed during the implementation period of this TMDL.

Milestone for 2004: The year 2004 marks the mid-point of the ten year implementation window for the watershed. At that point in time, milestones should be reached which will have at least eighty percent of the producers responsible for the land use activities cited in the local assessment participating in the implementation programs provided by the state. Additionally, sampled data from Gardner City Lake should indicate evidence of reduced phosphorus levels in the conservation pool elevations relative to the conditions seen over 1988-1998.

Delivery Agents: Depending upon confirmation of impairment and assessment of probable sources, the primary delivery agents for program participation will be county and city officials.

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